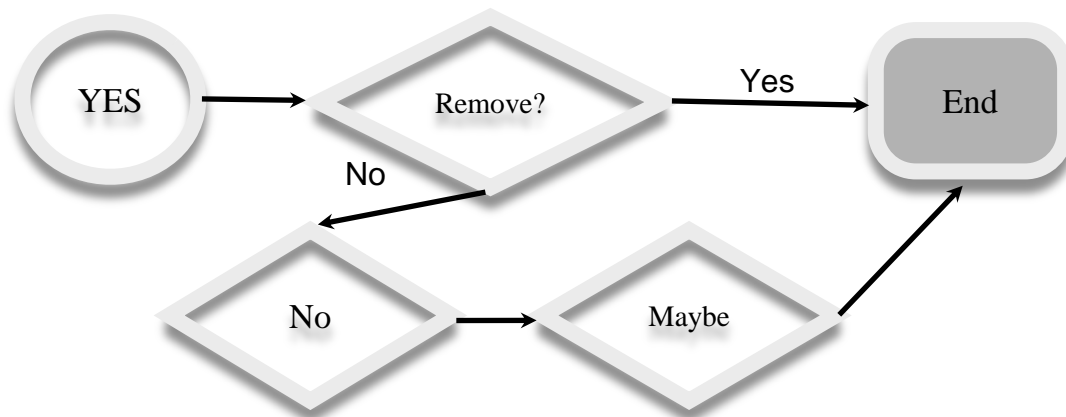**Automated identification of patients with a diagnosis of binge eating disorder from narrative**

electronic health records

Online Supplement

Overview

The Binge Eating Disorder tool utilized a set of rules expressed as regular expressions in combination with programming logic to utilize those rules in the proper context. Instances of binge eating disorder were found in the notes using regular expressions. A window of text was drawn around each instance and then rules were used to classify the instance within that context. Each instance was initially assumed to be a positive affirmation of binge eating disorder in the patient and then rules in three primary categories were applied, removal rules disqualifying this instance as being relative to the patient, rules that indicated this expression is part of a differential diagnosis, and rules that indicated this as an instance negating binge eating disorder in the patient. The rule categories were applied to each instance as demonstrated in the diagram below:

Binge Eating Disorder Instances

Instances of Binge Eating Disorder were found using the following regular expressions:

```
binge\s+eat(ing)?\s+(disorder|d/o)
```

Removal Rules

Removal rules indicate that the instance found is unrelated to the diagnosis of the patient. This occurs in the case of documentation about the disease, expressions of family history, and binge eating terms used in the description of other eating disorders. The following removal rules were matched using the CASE_INSENSITVE and DOTALL flags:

```
information\\s+on|materials\\s+provided|understanding\\s+binge\\s+
eating\\s+disorder|binge\\s+eating\\s+disorder\\s+screen|used\\s+t
o\\s+assess\\s+for\\s+binge\\s+eating|binge\\s+eating\\s+disorder\
\s+is\\s+a\\s+contraindication\\s+to\\s+surgery|binge\\s+eating\\s
+disorders[:].+QEWP-
R|what\\s+is\\s+binge\\s+eating|instrument.+assess.+criterian\\s+f
or|pamphlet|criteri(on|a)\\s+for|literature|group
eating\\s+disorders\\s+of\\s+anorexia\\s+nervosa,\\s+bulemia\\s+ne
rvosa\\s+and\\s+binge\\s+eating
(significant\\s+other|married\\s+to|mother|father|brother|sister|\
\bson\\b|daughter|uncle|cousin|aunt|wife|husband|next\\s+of\\s+kin
).+binge\\s+eating
designed\\s+to\\s+assess\\s+symptoms\\s+of\\s+binge\\s+eating|bing
e\\s+eating\\s+disorder\\s+is\\s+a\\s+criterion
Binge\\s+Eating\\s+Disorder\\s+Symptoms
```

Negation Rules

Negation rules mark each instance as negated for which a pattern match is found. The span of the original binge eating disorder mention from which the window was created was used as an anchor. Negation patterns for the window as a whole were applied separately from patterns applied to pre-anchor window text. Negation regular expressions were applied using the CASE_INSENSITIVE and DOTALL flags.

Full Window Text Negation Patterns

```
binge\\s+eating\\s+(disorder|d/o)\\?\\s+No

[_]{3,}\\s*((severe|mild.moderate)\\s+)?binge

[_]{5,}\\s*participate\\s+in\\s+treatment\\s+for\\s+binge

[_]+x[_]+\\s*your\\s+results\\s+are\\s+not\\s+suggestive\\s+of\\s+

bulemia\\s+nor\\s+binge

binge\\s+eating\\s+disorder\\?.+no

[_]+denies[_]+\\s*A.+recurrent\\s+episodes\\s+of\\s+binge

[_]+x[_]+\\s*absence\\s+of\\s+current\\s+binge
```

Pre Anchor Negation Patterns

absence\\s+of(\\s+a)?\\s+(diagnosis|diagnsosi)|denie(d|s).+symptom|does\\s+not\\s+meet\\s+require

ments\\s+for|not\\s+(report|suggest)\\s+any\\s+evidence\\s+of\\s+having|no\\s+(history\\s+of|h/o|ho)

|(did|does)\\s+not\\s+indicate|\\bnor\\b|not\\s+rise\\s+to\\s+the\\s+level\\s+of|(without|w/o|no)\\s+sig

ns\\s+of|no\\s+symptom(s|e)?\\s+of|not\\s+meet\\s+criteria|no\\s+diagnosis|rule.+out|r/o|no\\s+evide

nce|d(id|oes)\\s+not\\s+support\\s+(a\\s+)?diagnosis|negative\\s+for|(does\\s+not|doesn't|don't)\\s+(h

ave|meet\\s+diagnosis)|(patient|pt)\\s+denies|not\\s+suggest|absence\\s+of|not\\s+consistent\\s+with

Differential Diagnosis Rules

Differential Diagnoses rules were used to indicate that an instance was part of a differential diagnosis.

The binge eating mention around which the context window was drawn was used as the window anchor.

Differential patterns were applied to the window as a whole, to the window text preceding the anchor, and

finally to the text following the anchor. Differential regular expressions were executed using the

CASE_INSENSITVE and DOTALL flags.

Full Window Text Differential Patterns

```
[_]{3,}\\s*your\\s+results\\s+are\\s+not\\s+suggestive\\s+of\\s+bu
lemia\\s+nor\\s+binge
```

Pre Anchor Differential Patterns

```
assessment\\s+for|believe.+(has|have|had)|appears\\s+to\\s+have|si
milar\\s+to|suggestive\\s+of(.+eating\\s+disorder)?|suspect|probab
le|thinks\\s+he\\s+has|possibly|(high|at)\\s+risk\\s+for|leaning\\
s+towards|eating\\s+disorders\\s+such\\s+as|consider|think\\s+(s)?
he\\s+ha(s|d)|educated\\s+on|denie(s|d)\\s+any\\s+symptom|\\?|prob
ably|candidate\\s+for|likely|potential\\s+for|(patient|pt)\\s+stat
e(s|d).+ha(s|d|ve)|may\\s+(have|exhibit)|potential|versus|vs|behav
ioral\\s+model.+pertains\\s+to|possible|no\\s+recent|education|pos
sib(le|ility)|question\\s+of
```

Post Anchor Differential Patterns

```
is\\s+not\\s+(official|warranted)|vs|versus
```

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